

# Hamidreza Farhadi Tolie

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## EMPLOYMENT HISTORY

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### *Demonstrator*

School of Computing,  
Robert Gordon University, Aberdeen, United Kingdom

Sep 2022 - Present

### *PhD Researcher*

National Subsea Centre,  
Robert Gordon University, Aberdeen, United Kingdom

Feb 2022 - Present

### *Front-End Web Developer*

Behin Sayar Corporation, Zanjan, Iran

Aug 2017 - July 2018

### *Teaching Assistant*

Department of Computer Science and Information Technology,  
Institute for Advanced Studies in Basic Sciences, Zanjan, Iran

Sep 2016 - Mar 2021

## EDUCATION

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### *PhD Candidate in Artificial Intelligence*

National Subsea Centre, Robert Gordon University, Aberdeen, UK

Feb 2022 - Present

- **Research Areas:** AI, Machine Learning (ML), Deep Learning (DL) Computer Vision, Multimodal Image Fusion

- **Thesis title:** Multimodal image fusion and deep learning for condition monitoring in subsea applications

### *MSc in Computer Science - Data Mining*

Department of Computer Science and Information Technology, Institute for Advanced Studies in Basic Sciences, Zanjan, Iran

Sep 2018 - Oct 2021

- **Research Areas:** Image Quality Assessment, Image Processing, Machine Learning (ML) - Regression, Deep Learning (DL)

- **Thesis title:** Quality assessment of screen content images: no-reference and full-reference methods

### *B.Sc in Information Technology Engineering*

Department of Computer Science and Information Technology, Institute for Advanced Studies in Basic Sciences, Zanjan, Iran

Sep 2014 - Sep 2018

- **Thesis title:** Quality assessment of screen content images

## TECHNICAL COMPETENCE

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### **Areas of Specialization:**

- AI, Machine Learning (ML), Deep Learning (DL), Computer Vision, Image Processing, Multimodal Data Fusion, 3D Reconstruction, Database Management, Front-End web development, Web Applications, Computer Networks

### **Programming Languages:**

- C++, C#, Matlab, R, Python, SQL

### **AI, Machine Learning (ML), Deep Learning (DL), & Computer Vision Libraries and Models:**

- Libraries: TensorFlow, PyTorch, Scikit-learn, Keras, NumPy, Pandas, Matplotlib, SciPy, OpenCV, Open3D
- Models: Convolutional Neural Networks (CNNs) (YOLO, MobileNets VGG, Faster R-CNN, MASK R-CNN, UNet, Attention Modules), Generative Adversarial Network (GAN), Recurrent Neural Networks (RNNs), Long Short-Term Memory (LSTM), Gated Recurrent Unit (GRU), Residual Networks (ResNets)
- Algorithms: Object Detection, Object Tracking, Segmentation, Depth Estimation (Monocular + Stereo), Image Quality Assessment/Enhancement, 3D Reconstruction

### **Hardware Platforms & Embedded Systems:**

- NVIDIA Jetson Nano (Jetson Nano Module, AGX Orin), Intel Realsense D455, 3D MakerPro (Moose), Ping360 Sonar, IMAGENEX Sonar (Delta T 837A)

### **Web Application Development:**

- HTML, CSS, JavaScript, PHP, Streamlit (Python), phpMyAdmin, Web hosting, Virtual Private Systems (VPS)

### **Operating Systems:**

- Windows, Linux

### **Softwares & IDE's:**

- MATLAB, Anaconda, PyCharm, Visual Studio, Wireshark, LaTeX, Git

## RESEARCH EXPERIENCE & PROJECTS

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### 1. *SeaSense*

**Role:** PhD Researcher

**Funding Body:** Net Zero Technology Centre (NZTC), UK

**Partners:** University of Strathclyde | Oceaneering Int., UK

**Funding Value:** £1.2M

**Affiliation:** National Subsea Centre, Robert Gordon University, UK

**Contributions:**

- Worked on the development of the SeaSense project, focusing on creating an underwater visual system using stereo cameras and Sonar sensor.
- Developed algorithms and methodologies for improvement of depth estimation and 3D reconstruction to support robotic vision and facilitate robot manipulation tasks in underwater environments.
- Designed and developed a deep neural network to enhance the vision of the Remotely Operated Vehicles (ROV) to assist the ROV pilot.
- Developed image quality metrics to ensure the high-quality data acquisition.
- Implemented segmentation approaches to detect target objects in sonar images and estimate the distance for robot manipulation.
- Installing operating system and deployed the developed methods on an embedded system.
- Developed a software interface, both for web and desktop application, for easy and user-friendly usage.

### 2. *Subsea AI Body of Knowledge (SAIBOK)*

**Role:** Researcher

**Partners:** Net Zero Technology Centre (NZTC), TotalEnergies, BP, Chevron, Intel and Xodus.

**Affiliation:** National Subsea Centre, Robert Gordon University, UK

**Contributions:**

- Implemented image enhancement techniques to improve the data quality.
- Implemented deep learning-based classification methods to identify various anomalies related to subsea pipelines.
- Developed segmentation methodologies for improved anomaly detection with capability of detecting multiple anomalies in a single image frame.

## FUNDING APPLICATIONS

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### 1. **Role:** Lead Researcher

**Funding:** Interface Project

**Funding Value:** £5K with potential to fund a KTP

**Affiliation:** National Subsea Centre, Robert Gordon University, UK

**Title:** Optical Music Recognition

**Status:** Applied

### 2. **Role:** Principal Investigator

**Funding:** Strategic Research Investment – Catalyst Internal Fund 2023

**Funding Value:** £30K

**Affiliation:** National Subsea Centre, Robert Gordon University, UK

**Title:** Subaqueous Clarity: Enhanced Multimodal Imaging for Advanced Underwater Object and Anomaly Detection

**Status:** Unsuccessful

### 3. **Role:** Researcher

**Funding:** Innovation Fund 2023 Net Zero Technologies

**Funding Value:** £4M

**Affiliation:** National Subsea Centre, Robert Gordon University, UK

**Title:** Federated, and AI enabled Data Platform to Democratize, and Digitalize the Offshore Energy System

**Status:** Unsuccessful

## TEACHING EXPERIENCE

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Postgraduate level:

- **Programming for Business Analytics:** Spring 2024  
Assessed students python code snippets and report to analyse various business case studies.
- **Software Project Engineering:** Winter 2023 & 2024  
Held scrum meetings to teach agile framework to students and marked student reports.
- **Data Management:** Fall 2022 & 2023  
Helped as a demonstrator with lab sessions on SQL and marking students.
- **Image Processing:** Winter 2021  
Taught advanced image processing, instructed students on coding image processing techniques in MATLAB, and evaluated student work.

- **Computational Data Mining:** Fall 2019  
Designed projects to assess students' understanding of data mining techniques, focusing on analyzing top-rated movies using publicly available datasets.

#### Undergraduate level:

- **Intelligent Systems:** Spring 2019  
Taught basic machine learning methods, including linear regression, logistic regression, and their extensions for multi-class data, as well as gradient descent and optimization techniques. Provided an introduction to deep learning and assisted in the assessment of final AI projects.
- **Image Processing:** Winter 2018  
Taught the basics and fundamentals of image processing, instructed students on coding image processing techniques in MATLAB.
- **Computer Architecture 1 and 2:** Fall & Winter 2017  
Assisted in curriculum development, project design, and teaching computer architecture topics, covering basic CPU architecture and functionality, as well as assembly language programming for efficient code execution on CPUs.
- **Logic Circuits:** Fall 2016 & 2017  
As supplementary sessions, covered logic circuits, including Boolean algebra, logic gates, combinational and sequential circuits, flip-flops, and counters.

## PUBLICATIONS

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### Journal Articles:

1. **Tolie, H. F.;** Ren, J.; Blind Sonar Image Quality Assessment via Micro- and Macro-Scale Texture and Contour Features in the Wavelet Domain. *Manuscript is under review at Engineering Applications of Artificial Intelligence, 2024.*
2. **Tolie, H. F.;** Ren, J.; Blind Quality Assessment Using Channel-based Structural, Dispersion Rate Scores and Overall Saturation and Hue for Underwater Images. *Manuscript is under review at IEEE Journal of Oceanic Engineering, 2024.*
3. **Tolie, H. F.;** Ren, J.; and Elyan, E.; DICAM: Deep Inception and Channel-wise Attention Modules for Underwater Image Enhancement. *Neurocomputing 2024*, 585, 127585. <https://doi.org/10.1016/j.neucom.2024.127585>.
4. **Tolie, H. F.;** Faraji, M. R.; and Qi, X.; Blind Quality Assessment of Screen Content Images Via Edge Histogram Descriptor and Statistical Moments. *The Visual Computer 2023*, 1-16. <https://doi.org/10.1007/s00371-023-03108-1>.
5. **Tolie, H. F.;** Faraji, M. R.; Screen Content Image Quality Assessment Using Distortion-based Directional Edge and Gradient Similarity Maps. *Signal Processing: Image Communication 2022*, 101. <https://doi.org/10.1016/j.image.2021.116562>.

## CONFERENCE PROCEEDINGS

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**Protecting Visual Data Privacy in Offshore Industry via Underwater Image Inpainting, 2024 the 9<sup>th</sup> International Conference on Image, Vision and Computing. July 2024** **2024**

## PROFESSIONAL DEVELOPMENT

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**Reviewer:** - Signal, Image and Video Processing, 2023 International Conference on Brain-Inspired Cognitive Systems

**Organiser:** - Volunteer organizer at 34-th British Machine Vision Conference (BMVC2023), Aberdeen, UK

#### Posters:

- The Scottish Informatics and Computer Science Alliance (SICSA) 2022, Glasgow, UK: Multimodal Image Fusion and Deep Learning for Condition Monitoring in Subsea Applications.
- IEEE Subsea Innovation Technologies Workshop 2024, Aberdeen, UK: Automated Indexing and Anomaly Detection in Underwater Multi-View Survey Videos.

#### Presentations:

- Smart Digital Energy Transition Workshop 2024, Aberdeen, UK: Automated Indexing and Anomaly Detection in Underwater Multi-View Survey Videos.

#### Conferences:

- The British Machine Vision Association (BMVA) 1 day meeting on "Trustworthy Multimodal Learning with Foundation Models: Bridging the Gap between AI Research and Real World Applications", London, UK.
- The 34th British Machine Vision Conference (BMVC 2023), Aberdeen, UK.
- The Scottish Informatics and Computer Science Alliance (SICSA) 2023, Stirling, UK.
- The Scottish Informatics and Computer Science Alliance (SICSA) 2022, Glasgow, UK.
- Fifth IPM Advanced School on Computing (Artificial Intelligence), (Virtual) 2021, Tehran, Iran.
- The International Conference on Contemporary Issues in Data Science (CiDaS) 2019, Zanjan, Iran.

## AWARDS/HONOUR & SCHOLARSHIP

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PhD Fully-Funded Scholarship, Robert Gordon University, UK	2022 - Present
MSc Scholarship, Institute for Advanced Studies in Basic Sciences, Iran	2018-2021
Brilliant Talent Recognition, Institute for Advanced Studies in Basic Sciences, Iran	2018
Undergraduate Scholarship, Institute for Advanced Studies in Basic Sciences, Iran	2014 - 2018

## PERSONAL DETAILS

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Birthdate: 9 June 1996

Nationality: Iranian

Languages: English, Persian, Turkish, Talysh